

## SCIENTIFIC LETTER

# Emergency percutaneous coronary interventions for unprotected left main stenoses: immediate and long term follow up

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**A**cute occlusion of the unprotected left main coronary artery (LMCA) is fatal in most cases. The life of the patient can be saved by the rapid reperfusion of the occluded LMCA by means of catheter intervention. However, percutaneous coronary interventions (PCI) of LMCA are discouraged by most guidelines. We describe 35 patients who underwent emergency PCI of the unprotected LMCA.

## METHODS

Emergency PCI of the unprotected LMCA was performed in 35 cases, representing 0.2% of the 17 683 patients who underwent PCI at our centre between January 1990 and July 2001. Twenty six of the study patients (74.3%) were being treated in the setting of acute myocardial infarction (AMI). In the nine other patients (25.7%) the procedure was performed as an emergency treatment for dissection that occurred during coronary angiography. Patient characteristics and angiographic data are shown in table 1.

The magnitude of STT elevation in lead AVR is also shown in table 1. Twenty four patients (68.6%) had ST segment elevation in lead AVR. Patients with an LMCA occlusion due to complicated coronary angiography did not have a pre-treatment ECG.

## RESULTS

Twenty patients (57.1%) had a total occlusion of the LMCA. A stent was used in 25 patients (71.4%); in one case a cutting balloon was used and in one further case a rotablator was applied. In 20 patients (57.1%) an intra-aortic balloon pump was used. Cardiopulmonary resuscitation was needed in seven patients (20%). Six patients (17.1%) were transferred to the operating room for emergency coronary bypass surgery immediately after orthograde flow in the LMCA was obtained.

Median follow up was 722 days (interquartile range 0–1847 days). One year follow up reveals a cumulative mortality of 41%. The 15 patients who died did so under the following circumstances. Seven patients (58.3%) died within 10 minutes of arrival in the catheterisation laboratory because of haemodynamics that could not be corrected, in four of these patients attempts to open the occluded LMCA had not been successful, and three other patients died in cardiogenic shock despite recanalisation. Two patients survived the PCI procedure but died within 24 hours from cardiac failure. The remaining three patients died because of aspiration pneumonia on day 3, a repeated arrest on day 8, and one patient had a cerebrovascular accident as a complication of surgery for groin bleeding. None of the 20/35 (59%) early survivors died during the long term follow up. Additional revascularisations occurred in two of these 20 patients (10%), one patient underwent coronary artery bypass grafting (CABG) after 31 months, the other CABG and mitral valve surgery after 59 months. The Kaplan-Meier survival curve is shown in fig 1.

## DISCUSSION

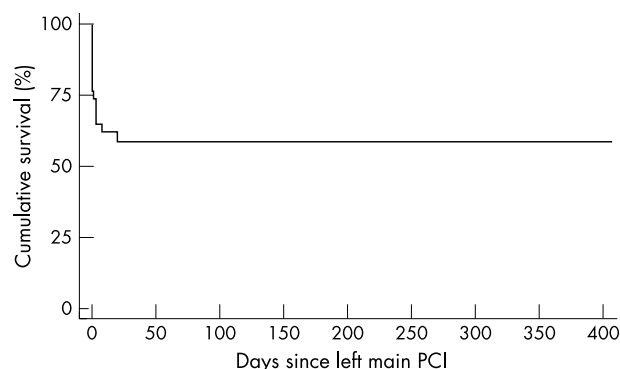
Generally, PCI is a safe and effective treatment for most significant coronary stenoses. An exception is PCI of the LMCA, which is not practised routinely, as balloon induced dissection of the LMCA may result in an immediately life threatening condition. In contrast, CABG is a safe alternative. However, emergency CABG is logistically not always feasible; even when the operating theatre and the surgical team are available, the preparations for cardiac surgery may last longer than the haemodynamic circumstances of the patient allows. In contrast, catheter interventions do not require significant preparations. Once the patient has arrived in the catheterisation laboratory, procedures may be carried out within minutes. Emergency catheter interventions may result in an

**Table 1** Characteristics and angiographic data of 35 patients undergoing emergency PCI of the LMCA

Total PCI (n = 17683)	Number of patients (%)
Urgent PCI of the unprotected LMCA	
AMI	26 (0.15%)
Complicated CAG	9 (0.05%)
Mean (SD) age (years)	67.1 (12.3)
Female	10 (29%)
History of CAD	30 (85.7%)
STT elevation in lead AVR	
+0.5 mV	8 (22.9%)
+1.0 mV	7 (20.0%)
+1.5 mV	1 (2.9%)
+2.0 mV	8 (22.9%)
Acute ECG not available	9 (25.7%)
No STT elevation	2 (5.7%)
Mean (SD) duration of ischaemia	104 (126) mins
Dominance of RCA	
Yes/no	25/10
RCA occluded	6 (17.1%)
Occlusion of LMCA	20 (57.1%)
Calcification	17 (48.6%)

AMI, acute myocardial infarction; CAD, coronary artery disease; LMCA, left main coronary artery; PCI, percutaneous coronary intervention; RCA, right coronary artery.

**Abbreviations:** AMI, acute myocardial infarction; CABG, coronary artery bypass grafting; LMCA, left main coronary artery; PCI, percutaneous coronary intervention



**Figure 1** Kaplan-Meier survival curve: cardiac death.

immediate restoration of haemodynamics, thus potentially saving lives.

Since PCI has been accepted as a standard treatment for AMI,<sup>1,2</sup> experience with emergency PCI for the unprotected LMCA is growing.<sup>3-5</sup> Most publications on this matter concern small subgroups from larger cohorts of patients undergoing PCI. De Luca (from the Zylstra group) so far describes the largest group<sup>5</sup>; 24 patients underwent PCI for LMCA obstruction in the setting of AMI. Fourteen of these patients (58%) died either in the catheterisation laboratory or during the initial hospitalisation.

In our study the time delay between onset of symptoms and time of restoration of coronary blood flow appears to be the only strong predictor of mortality in a univariate analysis. Each quarter of delay results in a 30% increase of the risk of death.

Our study concerns a group of 35 patients with LMCA stenosis or occlusion, presenting at our high volume intervention centre during a 10 year time period. It has never been a policy at our centre to perform PCI of the LMCA routinely, but the immediately life threatening condition of acute closure of the LMCA forced us to carry out this life saving procedure. We strongly believe that scarcely any of these 35 patients would have survived without the catheter

intervention. Applicable literature on the prognosis of untreated acute LMCA obstruction is lacking but in all studies on PCI under this condition, treatment failure results in low survival rates.

Fifteen patients died either during the procedure or within the first week thereafter. Survivors had an excellent prognosis with not one single patient dying during the 10 year follow up period. This remarkable finding is consistent with the only larger study published so far.<sup>5</sup> Not surprisingly, a significant proportion (10%) of the survivors underwent additional revascularisations at a later stage, either by PCI or CABG.

In conclusion, the lives of 59% of the study population were saved by the procedure.

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#### REFERENCES

- 1 Grines CL, Browne KF, Marco J, *et al*. A comparison of immediate angioplasty with thrombolytic therapy for acute myocardial infarction. *N Engl J Med* 1993;**328**:673-9.
- 2 Andersen HR, Nielsen TT, Rasmussen K, *et al*. A comparison of coronary angioplasty with fibrinolytic therapy in acute myocardial infarction. *N Engl J Med* 2003;**349**:733-42.
- 3 Spiecker M, Erbel R, Rupprecht H-J, *et al*. Emergency angioplasty of totally occluded left main coronary artery in acute myocardial infarction and unstable angina pectoris- Institutional experience and literature review. *Eur Heart J* 1994;**15**:602-7.
- 4 Tan WA, Tamai H, Park S-J, *et al*. Long-term clinical outcomes after unprotected left main trunk percutaneous revascularization in 279 patients. *Circulation* 2001;**104**:1609-14.
- 5 De Luca G, Suryapranata H, Thomas K, *et al*. Outcome in patients treated with primary angioplasty for acute myocardial infarction due to left main coronary artery occlusion. *Am J Cardiol* 2003;**91**:235-7.

## ELECTRONIC PAGES

Heart Online case reports: [www.heartjnl.com](http://www.heartjnl.com)

The follow electronic only articles are published in conjunction with this issue of *Heart*.

### Atrioventricular nodal re-entrant tachycardia in a patient with Ebstein anomaly

G Mönnig, K Wasmer, L Eckardt

The first case of successful slow pathway modulation is reported in a patient with Ebstein anomaly and recurrent atrioventricular nodal re-entrant tachycardia. Typical signals were recorded during electrophysiological study at the slow pathway region between the His bundle and the coronary sinus where ablation was performed successfully. Thus, slow pathway modulation seems to be a safe procedure even in selected patients with Ebstein anomaly.

(*Heart* 2004;**90**:e58) [www.heartjnl.com/cgi/content/full/90/9/e58](http://www.heartjnl.com/cgi/content/full/90/9/e58)

### Late gadolinium enhanced cardiovascular magnetic resonance in Becker muscular dystrophy

A Varghese, D J Pennell

Becker muscular dystrophy is a rare cause of dilated cardiomyopathy. A case of Becker muscular dystrophy is reviewed in which cardiovascular magnetic resonance showed previously unreported findings of extensive mid-myocardial late gadolinium enhancement. Similar detection of late gadolinium enhancement in conjunction with other uses of cardiovascular magnetic resonance may contribute significantly to the diagnosis and management of patients with this unusual and important diagnosis.

(*Heart* 2004;**90**:e59) [www.heartjnl.com/cgi/content/full/90/9/e59](http://www.heartjnl.com/cgi/content/full/90/9/e59)